

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
6 January 2005 (06.01.2005)

PCT

(10) International Publication Number
WO 2005/001889 A3(51) International Patent Classification:
G01N 21/63 (2006.01)

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:

PCT/US2004/013119

(22) International Filing Date: 28 April 2004 (28.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/468,729 7 May 2003 (07.05.2003) US

(71) Applicant (for all designated States except US): INDIANA UNIVERSITY RESEARCH & TECHNOLOGY CORPORATION [US/US]; 351 West 10th Street, Indianapolis, IN 46202 (US).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

Published:

(75) Inventors/Applicants (for US only): NIE, Shuming [US/US]; 1021 Wescott Lane, Atlanta, GA 30319 (US). BAILEY, Robert E. [US/US]; 1304 Brockton Dr. #B, Signal Mountain, TN 37377 (US).

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(74) Agent: HASAN, Salim A.; Leydig, Voit & Mayer, Ltd., Two Prudential Plaza, Suite 4900, Chicago, IL 60601-6780 (US).

(88) Date of publication of the international search report:

20 April 2006

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ALLOYED SEMICONDUCTOR QUANTUM DOTS AND CONCENTRATION-GRADIENT ALLOYED QUANTUM DOTS, SERIES COMPRISING THE SAME AND METHODS RELATED THERETO

(57) Abstract: An alloyed semiconductor quantum dot comprising an alloy of at least two semiconductors, wherein the quantum dot has a homogeneous composition and is characterized by a band gap energy that is non-linearly related to the molar ratio of the at least two semiconductors; a series of alloyed semiconductor quantum dots related thereto; a concentration-gradient quantum dot comprising an alloy of a first semiconductor and a second semiconductor, wherein the concentration of the first semiconductor gradually increases from the core of the quantum dot to the surface of the quantum dot and the concentration of the second semiconductor gradually decreases from the core of the quantum dot to the surface of the quantum dot; a series of concentration-gradient quantum dots related thereto; in vitro and in vivo methods of use; and methods of producing the alloyed semiconductor and concentration-gradient quantum dots and the series of quantum dots related thereto.

A3

WO 2005/001889 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/13119

A. CLASSIFICATION OF SUBJECT MATTER
IPC: G01N 21/63(2006.01)

USPC: 436/524,172,2;252/301.4R,301.6S;423/409,509,566.1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 436/524,172,2;252/301.4R,301.6S;423/409,509,566.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,306,610 B1 (BAWENDI et al) 23 October 2001 (23.10.2003), col. 5, line 65-col. 34, line 55.	1-19, 47-50, 55-59, 65-68, 73-78, 85-90, 97, 98 and 100

<input type="checkbox"/>	Further documents are listed in the continuation of Box C.	<input type="checkbox"/>	See patent family annex.
	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 22 February 2006 (22.02.2006)	Date of mailing of the international search report 10 MARCH 2006
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer C. Melissa Koslow Telephone No. (571) 272-1700 